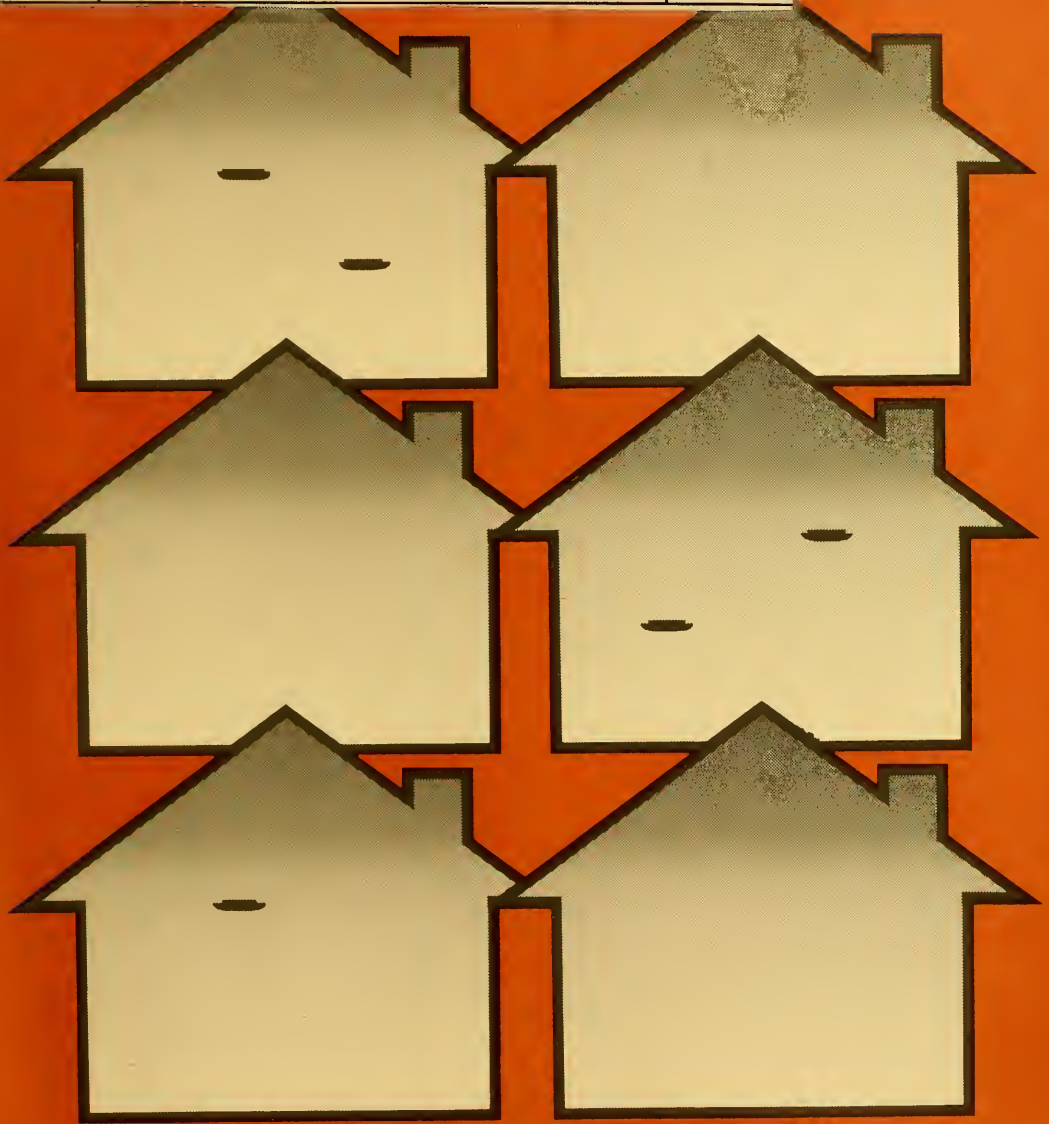


Results of a Survey of Smoke and Fire Detector Owners

FA-54
August 1981

37b Owners	Results of Survey of Smoke & Fire Detector 8/81
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A Detector in Every Other Home Summary Report

Federal Emergency
Management Agency

The conclusions, opinions and recommendations expressed here are those of the authors and not necessarily those of the Federal Emergency Management Agency, U.S. Fire Administration.

Results of a Survey of Smoke and Fire Detector Owners

A Detector in Every Other Home Summary Report

Prepared for
Federal Emergency Management Agency
U.S. Fire Administration
National Fire Data Center

Prepared by
Elrick and Lavidge, Inc.
Atlanta, Ga.

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INTRODUCTION

This final summary report presents highlights of a survey, conducted in January, 1980, to measure the number and characteristics of fire/smoke detectors used in residential dwellings in the United States. In addition, the survey focuses on the demographic profile and behavior patterns of the household, housing characteristics, and fire experience within the past six months.*

The Survey was sponsored by the Federal Emergency Management Agency (FEMA), U.S. Fire Administration, National Fire Data Center, and is a follow-up to an earlier study completed in the early summer of 1977. Comparisons between the 1977 survey and the present survey are made briefly within this summary. Additional information may be found in A Detector in Every Other Home: Results of a Household Survey of Smoke and Fire Detector Owners. Full Report.

The survey interviewed adults (age 18 and over) by means of a probability telephone sample which generated 1,200 respondents on a national basis. An additional oversample of 300 respondents was conducted in the U.S. Census Bureau Region of the South; results on these additional responses are not included in this Summary Report.

*A copy of the survey questionnaire used and a brief description of how to conduct a similar survey in your local area are available from the Office of Public Affairs, Federal Emergency Management Agency, Washington, D.C. 20472.

CONCLUSIONS

Smoke detectors are found in 50% of all United States households.* The incidence of smoke detector ownership has increased significantly in the last three years, from 22% in 1977. Smoke detector ownership is proportionately more likely in households headed by white males, with either larger incomes or with higher educational levels. Ownership is proportionately less likely in households headed by young heads of household (18-24 years of age) or elderly heads of household (age 65 and over). Detector ownership showed no relationship to the number of smokers in the household. Households that rent their homes are less likely to own detectors. More than half (59%) of all households have formulated an emergency escape plan.

In June of 1978, the U. S. Fire Administration (then under the U.S. Department of Commerce) published the first edition of Highlights of Fire in the United States. That report indicated 67.8% of all fire deaths occur in residences, and exceptionally high death rates in all properties were recorded for non-whites--93.1 deaths per million population for non-white males and 56.0 deaths per million population for non-white females. The report further indicated the elderly also were a high-risk group for fire deaths.

*This and other estimates of detector ownership may be slightly inflated because the telephone interview technique used in conducting this survey resulted in a slight underrepresentation of lower-income households. Based on a comparison of income distributions for the survey respondents and all U. S. households, the percentage of households owning detectors may be closer to 46%. This is not a large difference, and the major conclusions of the study are not affected by the discrepancy.

The current survey suggests members of the high risk groups for death by fire may also be members of households which do not own smoke detectors. On the other hand, a very large number of people have acquired smoke detectors, formulated a fire escape plan, or have implemented both measures, since 1977. This suggests a substantial base of risk reduction behavior exists.

These conclusions are supplemented by the following highlights of the survey which are organized according to the project's objectives: measuring the extent of ownership of smoke/fire detectors, identifying the number and type of detectors owned, examining characteristics of owners vs. non-owners, and identifying owners' experiences in acquiring and using detectors.

WHO OWNS DETECTORS?

Today, five out of every ten households own some sort of fire/smoke detector. In 1977, only two out of every ten households owned units. Ownership has more than doubled, which shows that households are recognizing the need for fire protection devices in the home (Table 1).

Table 1

Detector Ownership by Region *

	<u>Northeast</u>	<u>N. Central</u>	<u>South</u>	<u>West</u>	<u>Total</u>
Owner	135 (22.4%)* (47.9%)**	183 (30.5%) (57.9%)	183 (30.5%) (47.4%)	100 (16.6%) (46.5%)	601 (100.0%) (50.2%)
Non- Owner	147 (24.6%) (52.1%)	133 (22.3%) (42.1%)	203 (33.9%) (52.6%)	115 (19.2%) (53.5%)	598 (100.0%) (49.8%)
Total	282 (23.5%) (100.0%)	316 (26.4%) (100.05%)	386 (32.2%) (100.0%)	215 (17.9%) (100.0%)	1199 (100.0%) (100.0%)

*Percent to the right of the raw number of respondents is a row percent, i.e., a percent of all owners and/or non-owners living in the United States.

**Percent under the raw number of respondents is a column percent, i.e., a percent of all persons in the region who are owners and/or non-owners.

Only in the North Central region are there more detector owners than non-owners.

*The estimate of reliability for the total sample is $\pm 1.9\%$ at the 95% level of confidence. For the Northeast region, (Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania), it is approximately $\pm 3.6\%$; for the North Central region, (Ohio, Indiana, Illinois, Michigan, Wisconsin, Missouri, Iowa, Kansas, Nebraska, South Dakota, North Dakota, Minnesota), $\pm 3.4\%$; for the South, (Delaware, District of Columbia, Maryland, West Virginia, Virginia, North Carolina, South Carolina, Kentucky, Tennessee, Georgia, Florida, Alabama, Mississippi, Arkansas, Oklahoma, Texas), $\pm 3.1\%$; for the West, (Montana, Wyoming, Colorado, New Mexico, Arizona, Utah, Idaho, Washington, Oregon, California, Nevada), $\pm 4.1\%$.

WHAT KIND OF DETECTORS ARE OWNED?

Table 2

Number of Detectors in Homes (All Owners)

<u>Number of Detectors</u>	<u>Northeast</u>		<u>North Central</u>		<u>South</u>		<u>West</u>		<u>Total</u>	
	#	%	#	%	#	%	#	%	#	%
One	75	55.6	107	58.4	103	56.1	69	69.0	354	58.9
Two	36	26.7	43	23.5	50	27.3	17	17.0	146	24.2
Three	12	8.9	12	6.6	16	8.6	8	8.0	48	7.9
Four	4	3.0	7	3.8	7	3.7	3	3.0	21	3.5
Five or More	8	5.8	14	7.7	7	4.3	3	3.0	32	5.5
Total	135	100.0	183	100.0	183	100.0	100	100.0	601	100.0

More than eighty percent (83.1%) of respondents own one or two detectors.

The rest (16.9%) own three or more.

100% = 601 Respondents

Table 3

Sensor Type of Detectors Owned

Photoelectric	29.1%
Ionization	28.6
Other	5.2
Don't Know	37.1
	100.0%

Photoelectric sensors and ionization sensors were cited equally often, but the number of respondents who did not know the type of sensor accounted for the largest share of the sample (Table 3). In fact, sales figures favor ionization detectors by a wide margin, which strongly suggests that many respondents were wrong in their answers; these percentages are not reliable indicators of the relative usage of different types of sensors.

Table 4

Types of Power Supply Used for the Detectors

Battery-powered	75.2%
House Current	20.1
AC/DC	2.7
Don't Know	2.0
	<u>100.0%</u>

100% = 601 Respondents

Battery-powered detectors are favored heavily, more than three times as much as household- current-powered detectors.

Table 5

Brand Names Within the Home *

First Alert	9.7%
General Electric	8.0
Honeywell	6.8
Sears	4.8
Norelco	1.8
Nutone	1.2
Smoke Guard	0.8
Sentry	1.0
Other	9.5
Don't Know	56.4
	<u>100.0%</u>

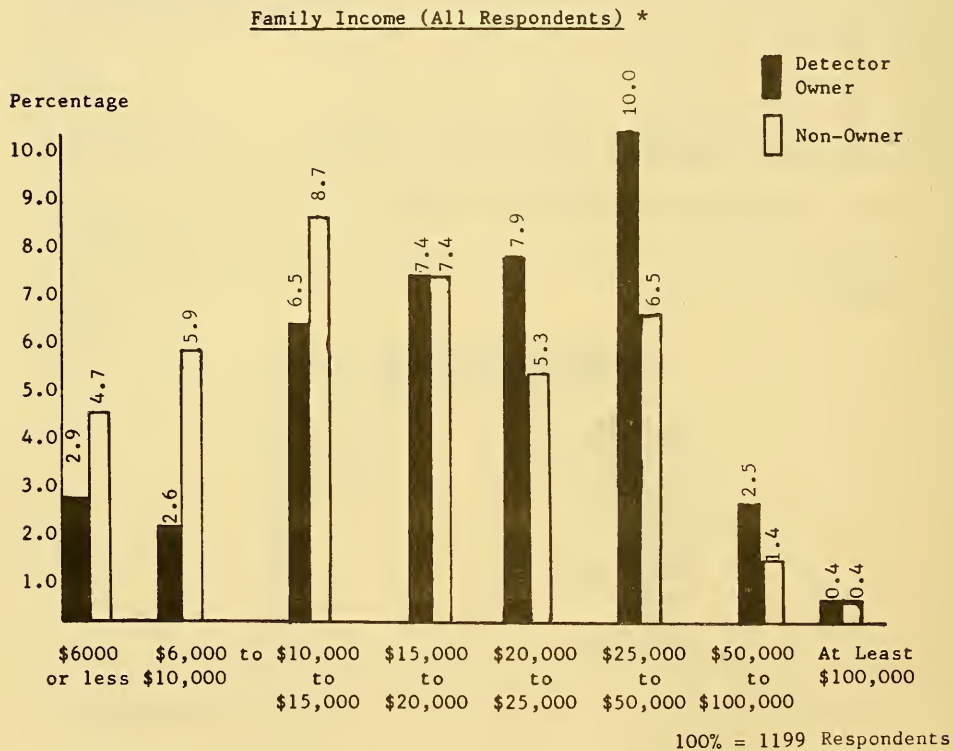
100% = 601 Respondents

Most respondents were unable to identify the brand name of the detector, although First Alert, General Electric, Honeywell and Sears were frequently mentioned.

WHAT ARE THE CHARACTERISTICS OF DETECTOR OWNERS AND NON-OWNERS?

There are a number of differences in the demographic profiles of owners of fire detectors versus non-owners, as shown in the following tables.

Table 6



*Not included in this table are respondents who refused to disclose family income (19.5%).

Family incomes are higher among owners of units than non-owners. This is not surprising: they can afford the units, and there is, presumably, more to protect (Table 6).

Table 7

Ethnic Group of the Head of Household

<u>Ethnic Origin</u>	<u>Detector Owner</u>	<u>Non-Owner</u>	<u>Total</u>
White	89.2%	81.8%	85.5%
Black	5.8	12.5	9.2
Spanish	1.3	2.3	1.8
Other	1.3	1.2	1.2
Refused	2.4	2.2	2.3
Total	100.0%	100.0%	100.0%

Whereas White owners are slightly more numerous than White non-owners, about two-thirds of the Blacks and Hispanics (minority groups) do not own units (Table 7).

Table 8

Education of Household Head

<u>Education</u>	<u>Detector Owner</u>	<u>Non-Owner</u>	<u>Total</u>
Less than college graduate	64.1%	72.5%	68.3%
College graduate	35.9	27.5	31.7
Total	100.0%	100.0%	100.0%

There is a small but statistically significant difference between college graduates and non-graduates in detector ownership. College graduates are more likely to own one or more detectors.

Table 9

Time at Current Address

<u>Residence</u>	<u>Detector Owner</u>	<u>Non-Owner</u>	<u>Total</u>
10 years or less	71.9%	67.8%	69.9%
11 years or more	28.1	32.2	30.1
Total	100.0%	100.0%	100.0%

Respondents with ten years or less at their present address are more likely to own detectors than are respondents with longer residence.

Very young household heads (age group 18-24 years) as well as older groups tend not to own units. In every region there are more owners in the age range between 25 and 54 than non-owners. Approximately two-thirds of the households with female heads are non-owners; and 10% more male heads of household own than do not. All groups with lower than average ownership rates tend to have lower or fixed incomes, and can less easily afford to put high priority on the ownership of these items.

Seven out of every ten households interviewed record the household head as married. Four out of these seven own fire units, which may be partly a consequence of their having more people in their family to protect; or this may reflect the fact that married households tend to have a male head of household and higher income.

The average household size is about three people. Households with three, four, or five people show a higher percentage ownership of units than households with either fewer than three or more than five occupants.

Table 10

Number of Smokers in Household

	<u>Detector Owner</u>	<u>Non-Owner</u>	<u>Total</u>
None	25.0%	25.0%	50.0%
1	15.6	15.3	30.9
2	8.7	8.3	17.0
3	0.6	1.1	1.7
4	0.2	0.2	0.4
Total	50.1%	49.9%	100.0%

100% = 1199 Respondents

There are surprisingly no significant connections between detector ownership and the number of smokers in households (Table 10). One out of every two homes interviewed has no smokers in the household. These households are equally divided among owners of fire detectors and non-owners of detectors.

Table 11

Type of Dwelling

	<u>Detector Owner</u>	<u>Non-Owner</u>	<u>Total</u>
One- or two-family	39.7%	33.7%	73.4%
Apartment/condo	8.1	14.0	22.1
Mobile home	2.2	1.3	3.5
Other	0.1	0.9	1.0
Total	50.1%	49.9%	100.0%

100% = 1199 Respondents

Smoke and fire detector ownership is markedly greater in one- or two-family dwellings and mobile homes than in apartments (Table 11).

Table 12

Detector Ownership and Home Ownership

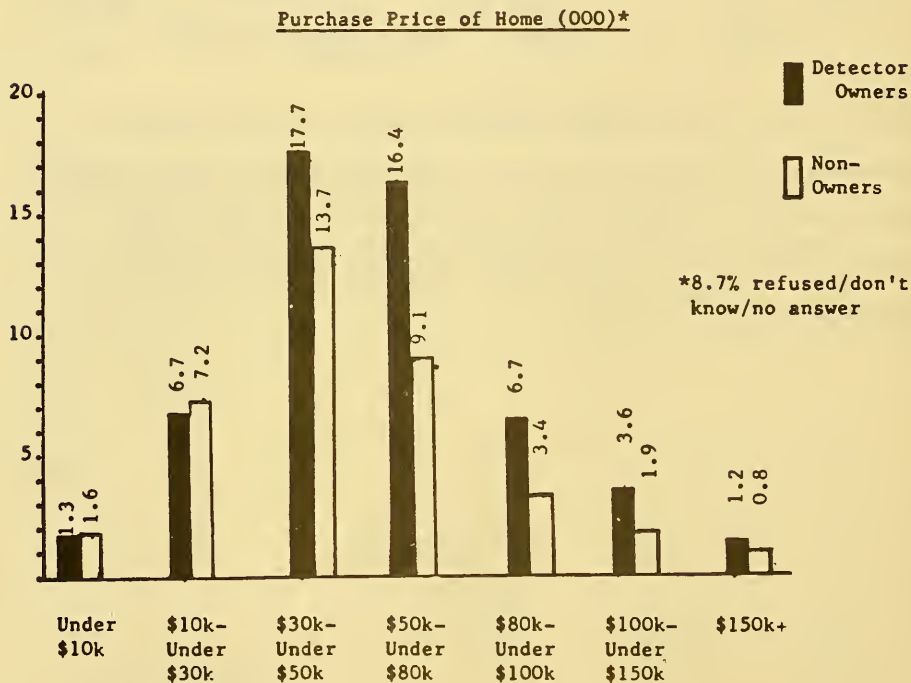
	<u>Detector Owner</u>	<u>Non-Owner</u>	<u>Total</u>
Own Dwelling	39.9%	28.8%	68.7%
Rent	<u>10.2</u>	<u>21.1</u>	<u>31.3</u>
Total	50.1%	49.9%	100.0%

100% = 1199 Respondents

There is obvious need to apprise renters or owners of rental units of the benefits of fire detectors since, except for the North Central region where the margin is slightly lower, (39.2% detector ownership among renters and 60.8% non-ownership), more than twice as many renters do not own units as do (Table 12).

More than half of all homeowners own fire detectors. The proportion of home owners who have detectors tends to increase as the purchase price of the home increases (Table 13).

Table 13



100% = 1199 Respondents

Table 14

<u>Type of Central or Primary Heating System</u>						
<u>Detector</u>	<u>Oil</u>	<u>Natural Gas</u>	<u>Electric</u>	<u>Coal</u>	<u>Other/ Refused</u>	<u>Totals</u>
Owners	10.2%	27.0%	10.1%	0.2%	2.6%	50.1%
Non- Owners	<u>8.9</u>	<u>27.8</u>	<u>10.4</u>	<u>0.1</u>	<u>2.7</u>	<u>49.9</u>
Totals	19.1%	54.8%	20.5%	0.3%	5.3%	100.0%

100% = 1199 Respondents

Natural gas is the most frequently used heating system for both fire detector owners and non-owners (Table 14). Where auxiliary units do exist, they are in the main part fireplaces. Fewer people with fireplaces as auxiliary units see the need for fire/smoke detectors than do owners of either space heaters or supplemental stoves for heating. (For more detailed data, see "A Detector in Every Other Home: Results of a Household Survey of Smoke and Fire Detector Owners. Full Report.")

Approximately 50% of all residences are less than 20 years old. Thirty-eight percent (38%) are over 20 years. The age of the remainder is unknown. More than half (58%) of those under 20 years are equipped with fire detector units, but less than half (46%) of those over 20 years are equipped with units.

HOW WERE DETECTORS OBTAINED?

Most detectors are acquired by a member of the household purchasing the detector. Many of the purchases have taken place within the last three years. (This tends to validate the large increase in detector incidence among United States households in 1977 (20%) compared with 1980 (50)).

Significant numbers of detectors are installed directly by the builder or the landlord. Some households have received detectors as gifts.

Table 15

Method of Obtaining Detectors*

Purchased by household member	54.4%
Received as a gift	20.0
Supplied by builder/landlord	<u>25.6</u>
Total	100.0%

100% = 601 Respondents

One-third (31.1%) of non-owners intend to purchase at least one unit, preferably an ionization unit.

WHAT HAS BEEN THE OWNERS' EXPERIENCE
WITH THEIR DETECTORS?

Eight out of every ten respondents who own a smoke or fire detector have administered some sort of test to their unit. However, a significant number of these tests were conducted infrequently or irregularly. This suggests a need for more awareness of maintenance. One out of every three homes with a unit reports a recent sounding of the unit alarm. Most of the alarm soundings were characterized by the respondents as false alarms--203 out of a total of 218 respondents.

Fifty-nine percent (59.0%) of all respondents have some sort of escape plan; 41.0% do not. Only 43.5% have ever practiced the plan. Because a fire is one of the most dangerous of disasters, there is need for greater preparedness among respondents.

Nearly 83% of all respondents indicated they have never been contacted by local authorities relative to fire safety or fire prevention programs.

Less than 1% of the households interviewed have registered an uncontrolled fire within the past six months. Three of the ten homes registering a fire were occupied at the time of the fire; and all three homes had detectors. All three had someone awake in the residence at the time of the fire. In two of the three cases, the detector failed to sound the alarm, because the person(s) in the home at the time discovered and extinguished the fire before the unit had an opportunity to sound. Four of the ten households which had fires are located in the Northeast, and one household recorded two fires within the past six months. Eight out of the 11 fires did \$100 or less direct damage; however, the three fires which resulted in damage of over \$100 occurred in homes without fire detector units.

WHY HAVE NON-OWNERS FAILED TO PURCHASE DETECTORS?

Table 16

Reasons for Non-Purchase by Non-Owners*

No interest	49.2%
Not necessary	24.3
Too expensive	10.4
Not reliable	1.6
Not worth the money	1.5
Keep forgetting	1.4
Can't install	0.4
Not aware of availability	0.1
Other	24.9
Don't know	0.4

*411 respondents named 471 reasons for non-purchase.

By far the principal reasons for non-purchase are "no interest" and "not considered necessary". Detector cost is considered a minor problem, and detector convenience and reliability are not considered problems to any significant degree. It appears instead that most non-owners have not been convinced of the value of a need for detectors. This probably reflects the widespread view that fire happens only to other people. Ironically, detector ownership rates are lowest among the most fire-prone groups -- the poor, the elderly and so forth. Thus, the people who need detectors most are the ones who are hardest to persuade of the need for detectors.

APPENDIX

ESTIMATE OF RELIABILITY

The survey results, of course, vary by the specific set of data involved. For the convenience of the reader, we are providing a table which can be used to estimate the statistical reliability of individual data sets. It is based on a 95% level of confidence. For example, the chances are 95 in 100 that a specific result does not vary, plus or minus, by the indicated number of percentage points. If an observed percentage point is, say, 60% in a sample of 1,000, the chances are 95 in 100 that the range of 58% to 62% includes the true percentage for the entire universe. Other data percentage points may be evaluated in a similar fashion.

Estimate of Sampling Tolerances for Survey Percentage at or Near the Indicated Levels

<u>Sample Size or Data Set Size</u>	<u>10% or 90%</u>	<u>20% or 80%</u>	<u>30% or 70%</u>	<u>40% or 60%</u>	<u>50%</u>
1200 interviews	1.1%	1.5%	1.7%	1.8%	1.9%
1000	1.2	1.6	1.9	2.0	2.1
900	1.3	1.7	2.0	2.1	2.2
800	1.4	1.8	2.1	2.3	2.3
700	1.5	2.0	2.3	2.4	2.5
600	1.6	2.1	2.4	2.6	2.7
500	1.7	2.3	2.6	2.8	2.8
450	1.7	2.3	2.6	2.8	2.8
400	1.8	2.4	2.7	2.9	3.0
350	1.9	2.6	2.9	3.1	3.2
300	2.1	2.8	3.2	3.4	3.5
250	2.3	3.0	3.5	3.7	3.8
200	2.5	3.4	3.9	4.2	4.2
150	2.9	3.9	4.5	4.8	4.9
100	3.6	4.8	5.5	5.9	6.0

The table is based on the formula $R = t \sqrt{\frac{p(1-p)}{n}}$

where:

R = reliability

t = a recommended t value which considers the
sample stratification - 1.2 for sample size ≤ 500
and 1.3 for sample sizes > 500

p = proportion or rate of occurrence

n = sample size

Federal Emergency Management Agency
P.O. Box 8181
Washington, D.C. 20024

